WLPCS
Geometry

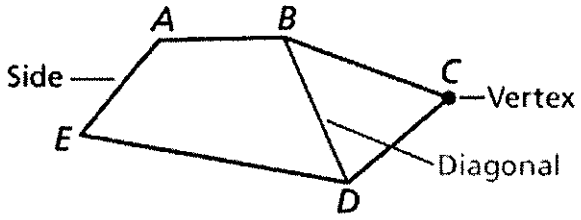
DAY 4 – Polygons AND 3-D

Name: _____ Date: _____ Per.: _____

Station 1 - Concept

Polygons

- A polygon is a closed plane figure formed by three or more segments that intersect only at their endpoints
- Each segment that forms a polygon is a side of the polygon
- The common endpoint of two sides is a vertex of the polygon
- A segment that connects any two nonconsecutive vertices is a diagonal



Theorem 6-1-1 Polygon Angle Sum Theorem

The sum of the interior angle measures of a convex polygon with n sides is $(n-2)180°$.

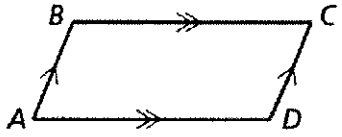
Theorem 6-1-2 Polygon Exterior Angle Sum Theorem

The sum of the exterior angle measures, one angle at each vertex, of a convex polygon is 360°.

Parallelogram Family

- A parallelogram is a quadrilateral with two pairs of parallel sides by definition

$\overline{AB} \parallel \overline{CD}, \overline{BC} \parallel \overline{DA}$

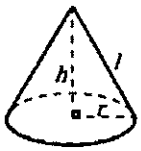
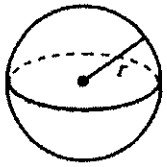


- Parallelograms have specific properties
  1. Both pairs opposite sides are parallel. $\overline{AB} \parallel \overline{CD}, \overline{BC} \parallel \overline{DA}$
  2. Both pairs of opposite sides are congruent. $\overline{AB} \cong \overline{CD}, \overline{BC} \cong \overline{DA}$
  3. Opposite angles are congruent. $\angle A \cong \angle C, \angle B \cong \angle D$
  4. Consecutive angles add to 180°. $m\angle A + m\angle B = m\angle B + m\angle C = m\angle C + m\angle D = m\angle D + m\angle A = 180°$
  5. Diagonals bisect
- If parallelograms have additional properties, the parallelogram may also be a rectangle, rhombus or a square
- If a parallelogram has congruent diagonals, then it is a rectangle
- If a parallelogram has perpendicular diagonals, then it is a rhombus
- If a parallelogram has diagonals which bisect pairs of opposite angles, then it is a rhombus
- If a parallelogram has diagonals which are perpendicular and congruent, then it is a square

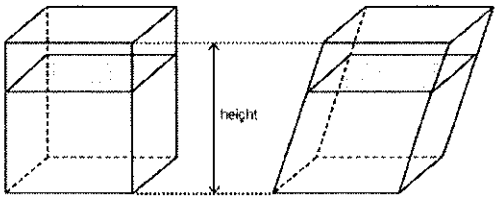
WLPCS **DAY 4 – Polygons AND 3-D**
Geometry

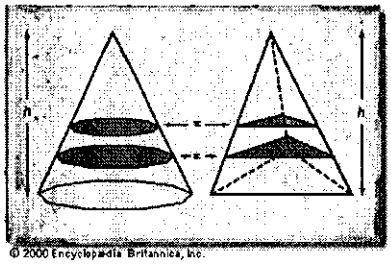
3-D

Volume Formulas:

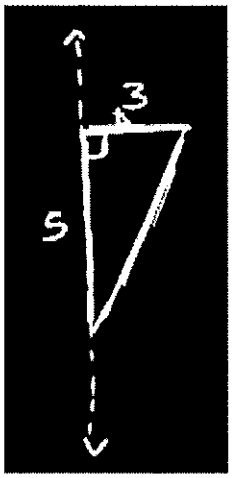
Cylinder	**Cone**	**Sphere**
 $Volume = \pi r^2 h$	 $Volume = \frac{\pi r^2 h}{3}$	 $Volume = \frac{4\pi r^3}{3}$

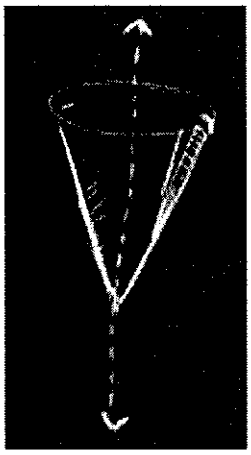
Cavalieri's Principle: solids of equal height and in which all corresponding cross sections match in area are of equal volume.





Rotating a 2-D Shape to Form a 3-D Solid





DAY 4 – Polygons AND 3-D

Station 2 – Polygon Problem Solving

Algebra Find the value of each variable.

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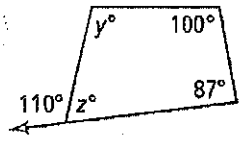

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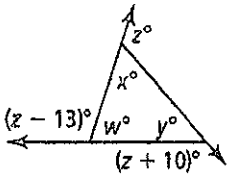

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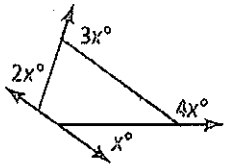


Find the sum of the measures of the interior angles of each convex polygon.

1. 11-gon **2.** 14-gon **3.** 17-gon

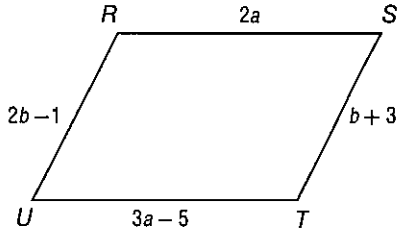
The measure of an interior angle of a regular polygon is given. Find the number of sides in the polygon.

4. 144 **5.** 156 **6.** 160

Parallelograms

ALGEBRA Find the value of each variable.

1.



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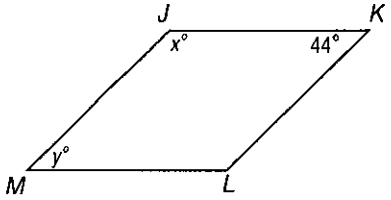

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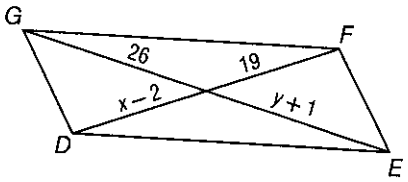

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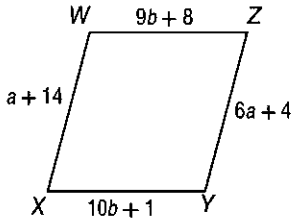

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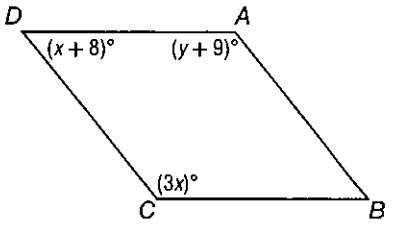

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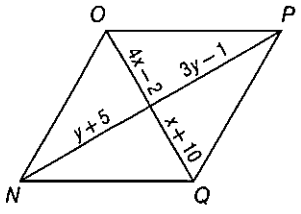
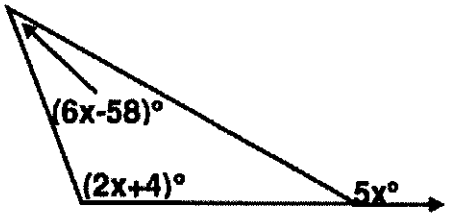
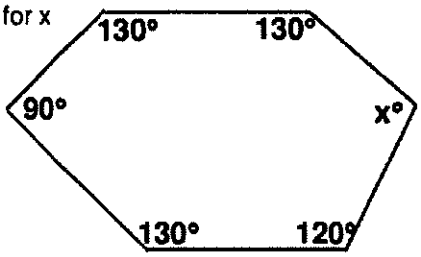


19) Solve for x



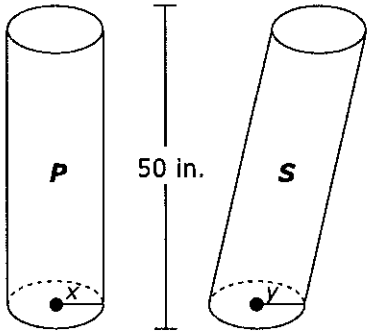
20) Solve for x



24) A pentagon has two exterior angles that measure $(3x)°$, two exterior angles that measure $(2x + 22)°$, and an exterior angle that measures $(x + 41)°$. If all of these angles have different vertices, what are the measures of the exterior angles of the pentagon?

Station 3: Cavalieri's Principle

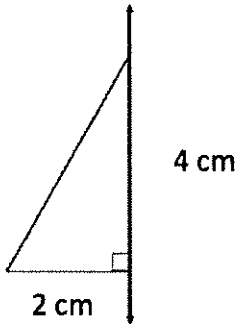
If $x = y$, how would you compare the volumes of Cylinders P and S? Justify your answer.



Station 4: Rotating 2-D Figures

Directions: Rotate the 2-D solid about the given axis. A) Name the 3-D solid formed. B) Determine the volume.

1)



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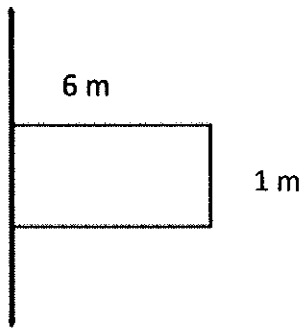

DAY 4 - Polygons and 3-D ANSWER KEY

Station 2

29. $y = 103^\circ$, $z = 70^\circ$

30. $z = 121^\circ$
$w = 72^\circ$
$y = 49^\circ$
$x = 59^\circ$

31. $x = 36$

1. 1,620°

2. 2,160°

3. 2,700°

4. 10 sides

5. 15 sides

6. 18 sides

1. $a = 5, b = 4$

2. $y = 44^\circ$, $x = 136^\circ$

3. $y = 25$, $x = 21$

4. $b = 7$, $a = 2$

5. $x = 43^\circ$, $y = 120$

6. $y = 3$, $x = 4$

19. $(6x - 58) + (2x + 4) = 5x$

$8x - 54 = 5x$

$-54 = -3x$

$18 = x$

20. $x = 120^\circ$

24. $2(3x) + 2(2x + 22) + (x + 41) = 360$

$6x + 4x + 44 + x + 41 = 360$

$11x + 85 = 360$

$11x = 275$

$x = 25$

$75^\circ, 75^\circ, 72^\circ, 72^\circ, 66^\circ$

Station 3

If $x=y$, the volumes of P and S are the same. Cavalieri's Principle states that solids of equal height and in which all corresponding cross sections are equal in area are equal in volume. The height is 50 in. for cylinder P and S. The radii of the bases are the same so the area of each base, and therefore each cross section, will be the same.

Station 4

① A) Cone

B) $\frac{16}{3}\pi cm^3$ or $5.\bar{3}\pi cm^3$ or $16.7cm^3$

② A) Cylinder

B) $36\pi m^3$ or $113.04 m^3$